CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter will be description about the software and hardware involved in this project. The software involved is MIT App Inventor for developing the Android app and Arduino IDE which is used for programming the Arduino Mega. While the hardware is the inclusion of ultrasonic onto the RC truck.

3.2 HARDWARE

3.2.1 ULTRASONIC SENSOR

The sensor used for this project is the ultrasonic sensor. The ultrasonic sensor used is HC- SR04 which is easily available on any electronic store. The purpose of it is to detect the distance between the robot and any object or obstacles in front of the robot.

The working principle of this ultrasonic sensor is the same as the sonar echo used by the creature bat as shown in the Figure 21 below. The sensor itself will generate ultrasonic sonar echo which is 40 kHz and is beyond the range of hearing of human ear. The sonar echo is reflected back to the sensor when the sonar echo hit on any object of obstacles. The reflected echo is detected by the sensor echo sensor. The time for a pulse of sonar echo generated from the sensor to travel to the object and reflected is used to calculate the distance between the sensor and the object.

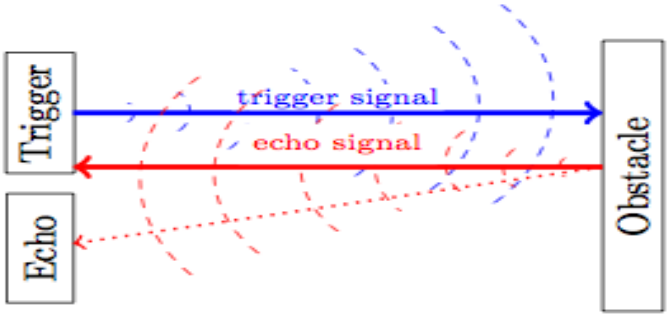


Figure 3.1: Ultrasonic principle of detection

Source: www.electronics-lab.com

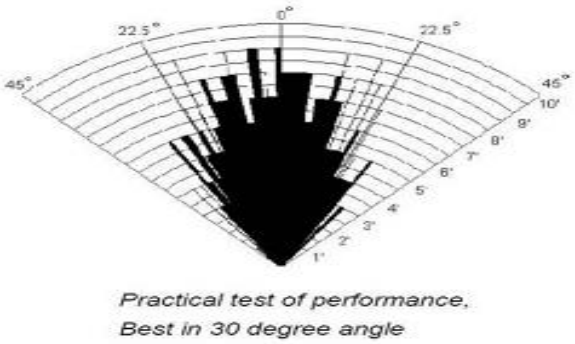
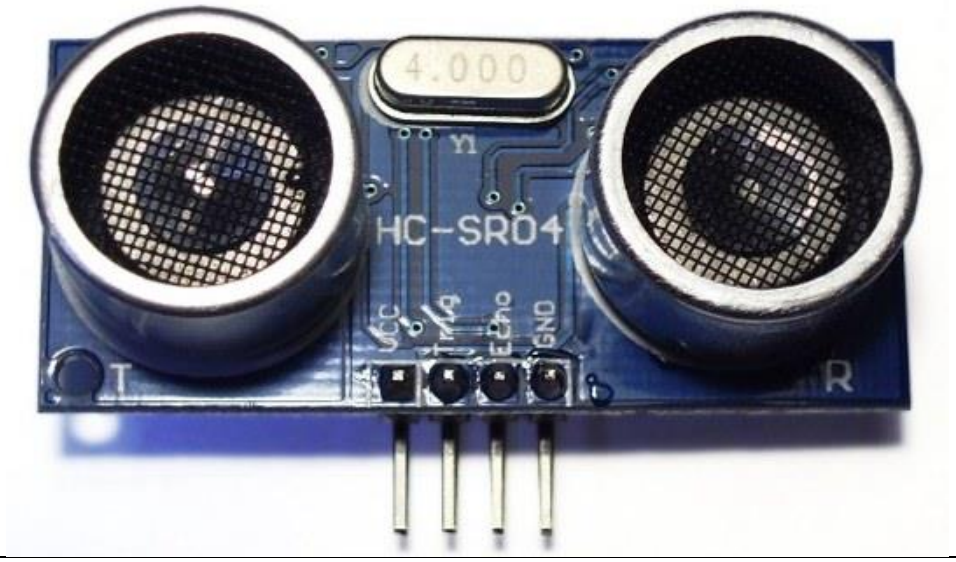


Figure3.2: The range of angle for detection.

Source: www.ce.rit.edu

Table 3.1: Specifications of the ultrasonic sensor.



Features

- Provides precise, non-contact distance measurements within a 2 cm to 3 m range
- Detect up to 22.5° of angle
- Simple pulse in/pulse out communication
- Burst indicator LED shows measurement in progress
- 20 mA power consumption
- Narrow acceptance angle
- 3-pin header makes it easy to connect using a servo extension cable

Key specifications

- Power requirements: +5 VDC
- Communication: Positive TTL pulse
- Dimensions: 0.81 x 1.8 x 0.6 in (22 x 46 x 16 mm)
- Operating temp range: +32 to +158 °F (0 to +70 °C)

3.2.2 BLUETOOTH MODULE

The communication between the android device and the mobile robot itself is established by using the Bluetooth module which is HT Bluetooth Module HC-05. Using the Bluetooth module the wireless communication between the robot and the android device easily can be established compare to other type of communication. For example, RF control which is prone to interference when it is operating in the same frequency with other network.